on said planar surface of said first side of the substrate" as defined in claim 1. Neither one nor a combination of discloses "subminiature through holes having a diameter in a range of about 0.002 - 0.006 filled with electrically conductive material" , as further required by claim 1.

Knudson et al. at col. 5, line 32 discloses that "electrode body 14 was a carbon disc of 2.032 mm diameter" mounted in an enlarged recess in the substrate. The Figs. 9A and 9B electrode of Knudson et al. is disposed in an enlarged 2.032 mm through hole in the substrate and not "on the planar surface" as claimed. Knudson et al. does not disclose the diameter of the through hole 20 or pin 18 in the through hole. The illustration clearly shows it to be at least two thirds (2/3) diameter of disc 14. Therefore the through hole is at least 1.3 mm, which makes it close to 1/16th of an inch, not 0.002-0.006 inch as claimed..

Brown discloses a construction like Betts and does not disclose subminiature through holes through a "primary supporting substrate" and does not disclose a flow channel between an inlet and an outlet to allow analyte to pass through a housing over sensors. He discloses a solid state electrode fabricated using a screen printing system. A primary supporting substrate 21 has a layer of silicon dioxide 22 on which an aluminum electrode 23 is deposited and over which a layer of silicon nitride 25 is arranged. There is no through hole through the primary supporting substrate as claimed. A hole in a protective layer does not suggest a through hole from a sensor on one side of a substrate to a conductor on the other side of the substrate. Furthermore, there is no suggestion or motivation to provided in any of the references cited by the Examiner to provide such a subminiature thru-hole ***directly under*** the sensor in Beets.

Brown et al. at col. 6, line 53 discloses a 600 μm via hole in a silicon nitride layer on a substrate, not through a primary supporting substrate as claimed. The term primary supporting

substrate has a definite meaning in the art, and does not include a coating on a primary supporting substrate. See enclosed page 573 from the 1974 Radio Shack *Dictionary of Electronics*. The Examiner is not permitted to give a meaning repugnant to the usual meaning of the term. MPED 608.01(o).

Europe '639 does not disclose or in any way suggest through holes in a primary supporting substrate as claimed. It merely discloses apertures (perforations) 4 in a protective layer 2 of electrically insulating film to allow electrically conductive material 3 exposed apertures to create a microdisc array electrode. An electrode comprises multiple areas of the conductive material. There are no through holes in the primary supporting substrate as claimed.

The claimed subminiature through hole has many unexpected advantages including enabling forming an electrode in a single layer directly over the hole on the planar surface of the primary supporting substrate. It also enables the construction of compact and quick response sensor assemblies. Moreover, none of the secondary references suggest nor motivate one skilled in the art to provide a thru-hole ***directly under*** the sensors of Betts.

The applicants' invention is directed to an improvement over the Betts type sensor unit and particularly to a structure to provide a sensor which remains accurate over a relatively long period of exposure to electrolytes and blood samples, uses a very small sample size, detects the concentration of a number of different electrolytes and the partial pressure of a number of blood gasses all in a single analysis, and in which a blood sample may be heated very rapidly to a known stable temperature. To this end applicants' invention is defined by "a plurality of sensors deposited on a first side of the substrate; a plurality of electrical conductors deposited on a second

side of the substrate; a plurality of subminiature thru-holes having a diameter in the range of about 0.002-.006 inches filled with electrically conductive material, each thru-hole disposed directly under a corresponding one of the sensors for coupling one of the sensors with one of the electrical conductors", as defined by claim 1 and with slightly different language in claim 19, which neither Betts nor any suggested combination of Betts and the other references disclose or in any way suggest.

In contrast, Betts is not concerned with the applicants' problem or their solution. He discloses that a patterned metallic layer 113 has metallic external leads 146-160 on the other side of the substrate 111, as stated at cl. 19, line 53-60. Moreover, Betts neither teaches nor suggests a subminiature thru-hole disposed directly under a sensor, as recited in Claim 1, more particularly he does not teach or suggest a subminiature through hole having the dimensional range of 0.002 - .006 inches. Betts has no need for the claimed construction and would not obviously benefit from it.

Claims 4 and 5 stand rejected under 35 U.S.C. §103 as being unpatentable over Betts in view of Knudson et al., or Brown et al. or Europe and Grubb. Applicants respectfully traverse the Examiner's rejection for the reasons as pointed out above with respect to claims 1-3, 6-13. None of the references cited teach or suggest the specified sensors on a planar surface of a primary supporting substrate or a subminiature thru-hole ***directly under*** the sensors. Furthermore, there is no suggestion or motivation in any of the references to combine them with Betts to provide a subminiature thru-hole ***directly under*** the sensor. Moreover, the elongated tubular electrode half cell of Grubb does not teach or suggest an electrode or sensor that can be mounted on a planar surface of a primary supporting substrate as claimed. Moreover, there is no teaching or suggestion of modifying the sensors of the Betts combination to provide the claimed invention.

Claims 14 and 15 stand rejected under 35 U.S.C. §103 as being unpatentable over Betts in view of Pace, et al. '978, Pace '410, Knudson et al., or Brown et al. with or without Europe and Buzza Applicants respectfully traverse the Examiner's rejection for the reasons as pointed out above with respect to claims 1-3, 6-13. None of the references cited teach or suggest the specified sensors or a subminiature thru-hole ***directly under*** the sensors as pointed out above. Furthermore, there is no suggestion or motivation in any of the references to combine them with Betts to provide a subminiature thru-hole ***directly under*** the sensor. Buzza does not disclose oxygen sensors that can be formed in the specified manner on the specified substrate. Moreover, there is no teaching of how or why one would provide a dome in a in a flow channel of the claimed encasement and substrate combination.

Contrary to the Examiner, Buzza does not teach a flow channel having a plurality of sensors including an oxygen sensor and wherein the flow channel has a dome which increases the volume directly about the oxygen sensor. The dome at the end of a cylinder in Buzza doesn't suggest the claimed combination or modification. Moreover, there is no teaching or suggestion in any of the references for combining Buzza with them and modifying the passage of the Betts combination to provide the claimed invention including the dome over certain sensors.

Claims 16 and 17 stand rejected under 35 U.S.C. §103 as being unpatentable over Betts in view of Knudson et al., or Brown et al. with or without Europe and Pace '410 and Kuhn et al. Applicants respectfully traverse the Examiner's rejection for the reasons as pointed out above with respect to claims 1-3, 6-13, 14 and 15. None of the references cited teach or suggest a subminiature thru-hole ***directly under*** the sensors. Furthermore, there is no suggestion or motivation in any of the references to combine them with Betts to provide a subminiature thru-hole ***directly under*** the sensor.

Moreover, there is no teaching or suggestion in any of the references for combining Buzza with them and modifying the passage of the Betts combination to provide the claimed invention including the dome over certain sensors. Additionally, there is no teaching or suggestion in any of the references for combining Kuhn et al. with them and modifying the Betts combination to provide the claimed combination including the claimed sensors and the further feature of a hematocrit sensor in the combination. The Examiner is treating applicant's claims as a catalog of elements and has employed hind sight reconstruction to pick bits and pieces from numerous separate prior art references to meet those elements.

Pace does not disclose leads on the other side of the substrate, and is even less pertinent that Betts. None of the references cited teach or suggest modifying Betts with Pace to place a subminiature thru-hole ***directly under*** the sensors for connection to leads on the other side of the substrate. Furthermore, there is no suggestion or motivation in any of the references to combine them with Betts to provide a subminiature thru-hole ***directly under*** the sensor. The Examiner has chosen bits and pieces of the claimed combination from the prior art and put them together using impermissible hindsight construction in light of applicants disclosure.

The objection to claims 6 and 20 re "third cell" is noted. The specification and claims have been amended to change "a third cell" to encasement material reducing cell . The existence and function of the this cell to reduce the amount of encasement material adjacent to the flowcell is adequately explained at page 35 of the specification.

It is believed that this application is now in condition for allowance and reconsideration is earnestly solicited.

No additional fees are due. Please charge any deficit or credit any excess to our Deposit Account No. 02-0460.

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